

PATENT COOPERATION TREATY

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From the
INTERNATIONAL SEARCHING AUTHORITY

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To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/GB2004/000934

International filing date (day/month/year)
05.03.2004

Priority date (day/month/year)
17.04.2003

International Patent Classification (IPC) or both national classification and IPC
G01N27/407, G01N33/00

Applicant
THE BOC GROUP PLC

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/000934

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ in written format
 - ☐ in computer readable form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/GB2004/000934

Box No. II Priority

1. ☒ The following document has not been furnished:

- ☒ copy of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(a)).
☐ translation of the earlier application whose priority has been claimed (Rule 43bis.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	3,5,6,7,8,12,16,17,20,21-23,31,34-37
	No: Claims	1- 4,9,10,11,13,14,15,18,19,24,25,26,27,28,29,30,38-44,45
Inventive step (IS)	Yes: Claims	
	No: Claims	1-45
Industrial applicability (IA)	Yes: Claims	1-45
	No: Claims	

2. Citations and explanations
see separate sheet

Reference is made to the following documents:

D1: US-A-3 576 730
D2: US-A-5 522 979
D3: US-A-5 331 310
D4: EP-A-0 245 717
D5: US-A-3 655 546
D6: US-A-5 527 446
D7: US-A-6 073 478
D8: EP-A-1 039 292
D9: US-A-4 370 206
D10: GB-A-2 117 121
D11: US-A-5 194 697

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- (1) The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of independent claims 1, 40 and 45 is not new in the sense of Article 33(2) PCT.

claim 1:

The document **D1** discloses (the references in parentheses applying to this document): a contaminant molecule sensor (fig. 1) configured for use in a vacuum environment¹, the sensor comprising a measurement electrode (12) comprising a catalyst (Pt-coil 14) selected for its ability to catalyse the dissociation of a contaminant molecule (O₂) into its

¹ these kind of solid electrolyte gas sensors are suitable for the use in vacuum; furthermore, the expression "vacuum" is so broad that it does not limit the scope for which protection is sought.

ionic species, a reference electrode (13) comprising a catalyst (Pt-coil 16) selected for its ability to catalyse the dissociation of a reference molecule into its ionic species, and a solid-state ionic species conductor (zirconia) bridging the measurement electrode and the reference electrode, the conductor being selected to conduct an ionic species common to the dissociated contaminant and reference molecules, and means for initiating the catalysis of the dissociation of the reference and the contaminant molecules (heater coil 24).

The subject-matter of claim 1 is also disclosed by various other solid-electrolyte gas sensors, e.g. D2 (fig. 1-3, abstract, col. 7, l. 40- col. 10, l. 13)

claim 40:

D1 discloses a method of detecting or monitoring the presence of a contaminant molecule in a monitored environment, the method comprising the steps of providing an electrochemical cell comprising a measurement electrode comprising a catalyst selected for its ability to catalyse the dissociation of a contaminant molecule into its ionic species, a reference electrode comprising a catalyst selected for its ability to catalyse the dissociation of a reference molecule into its ionic species, and a solid-state ionic species conductor bridging the measurement electrode and the reference electrode, the conductor being selected to conduct an ionic species common to the dissociated contaminant and reference molecules, providing, on a side of the cell bounded by the reference electrode, a source of the reference molecules, initiating the catalysis of the reference and contaminant molecules, monitoring a parameter of an electrical current produced in the cell, and, from the monitored parameter, calculating the partial pressure of the contaminant molecule in an environment on the side of the cell bounded by the measurement electrode relative to that on the side of the cell bounded by the reference electrode.

The subject-matter of claim 40 is also disclosed by various other documents (see search report).

claim 45:

D5 discloses the use of an electrochemical sensor to detect or monitor the presence of contaminant molecule in a vacuum environment.

(2) The following is said for dependent claims:

The claims do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty or inventive step, see the corresponding passages cited in the search report.

The embodiments mostly relate either to the various catalysts of the electrodes or the ion-conductors themselves, or the reference materials. These features, however, are merely standard features in that field and are adapted by the skilled person in order to detect various gases.

claims 2-7: heater and temperature sensor details, disclosed in various documents or obvious for those skilled in the art.

claim 8: It is not clear where the vacuum feed-through connection is fed through and what the advantage of that feature is with respect to normal sealed conductive tracks of standard solid-electrolytic gas sensors as **D1** or **D2**.

claim 9,11: The additional feature of a seal is already disclosed in **D1** (abstract, (34)). The expression "seals for connection to a vacuum environment" is not clear. A seal seals the reference environment from the outside. It is also unclear what "at least partly bound by the reference electrode" of claim 11 means,

claim 10: The additional feature is already disclosed in **D2** (fig. 1,3, (40))

claim 12: constructional detail of sensor (Art. 33(3)PCT).

claims 13,15,18: **D1** (Nickel/Nickel oxide reference electrodes, abstract).

claim 14: H⁺ ion conductor and solid state source is selected from a metal (Ag) in case that the gas to be measured is hydrogen see **D7** (Art. 33(3)PCT).

claims 16,17: adaption of electrode materials for different detection gases (Art. 33(3)PCT).

claims 19,20: see **D8** Ag⁺ ion conductors with Ag-salt as solid state source; (Art. 33(3)PCT).

claims 21,22: **D3** (fig. 1, col. 3-5)(Art. 33(3)PCT).

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/GB04/00934

- claim 23: the additional feature of an organic liquid as a liquid state source does not involve inventive merit (Art. 33(3)PCT).
- claims 24: see **D1** (Art. 33(3)PCT).
- claims 25,26: see **D7**.
- claims 27,28: see **D1**.
- claims 29-31: see **D8**.
- claims 32,33: see **D1**.
- claims 34-37: various catalyst combinations common in that field and dependent on the gas to be detected (see **D9**)(Art. 33(3)PCT).
- claims 38,39,41,42,43,44: see **D1**.

(3) Miscellaneous

- The features of claims 1 and 40 are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
- A document reflecting the prior art described on page 12 and fig. 1, is not identified in the description (Rule 5.1(a)(ii) PCT).
- Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art is not mentioned in the description, nor are these documents identified therein.
- the back reference of claim 10 appears to be false. Claim 10 should have a reference solely to claim 3.